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| 01.30K | <i>Handbooks and dictionaries</i> | 05.40 | Fluctuation phenomena, random processes, and Brownian motion |
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| 02.20 | Group theory | 06.30L | <i>Measurement of basic electromagnetic variables</i> |
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| 03.00 | CLASSICAL AND QUANTUM PHYSICS; MECHANICS AND FIELDS | 07.20 | Thermal instruments and techniques |
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- 07.60F *Polarimetry and ellipsometry*
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 07.60L *Interferometry*
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 07.75 Mass spectrometers and mass spectrometry techniques
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 11.40 Currents and their properties
 11.50 Dispersion relations and sum rules
 11.60 Complex angular momentum; Regge formalism
 11.80 Relativistic scattering theory
 11.90 Other topics in general field and particle theory
- 12.00 SPECIFIC THEORIES AND INTERACTION MODELS; PARTICLE SYSTEMATICS
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 12.20 Models of electromagnetic interactions
 12.20D *Specific calculations and limits of quantum electrodynamics*
 12.20F *Experimental tests of quantum electrodynamics*
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 12.35E *Applications of quantum chromodynamics to particle properties and reactions*
 12.35H *Phenomenological composite models of particle structure and reactions (partons, bags, etc.)*
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 12.40P *Absorptive, optical, and eikonal models*
 12.40Q *Potential models*
 12.40R *Peripheral models (one or more particle exchange)*
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 13.75 Hadron-induced low- and immediate-energy reactions and scattering, energy ≤ 10 GeV
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 13.75G *Pion-baryon interactions (energy ≤ 10 GeV)*
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 21.30 Nuclear forces
 21.40 Few-nucleon systems
 21.60 Nuclear-structure models and methods

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 25.50 ^2H - and ^3H -induced reactions and scattering
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 25.85 Fission reactions
 25.88 Fusion reactions
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 28.20 Neutron physics
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 28.42 Fission reactor materials
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- 28.43 Fission reactor operation
 28.44 Fission reactor protection systems, safety and accidents
 28.47 Fission reactor decommissioning
 28.50 Fission reactor types and applications
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 31.15 General mathematical and computational developments
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 31.20L *Statistical model calculations (Thomas-Fermi and Thomas-Fermi-Dirac models)*
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 31.20T *Electron correlation and CI calculations*
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 31.30J *Radiative and relativistic effects*
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 32.60S *Stark effect*
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 32.80 Photon interactions with atoms
 32.80B *Level crossing, optical pumping, population inversion*
 32.80D *Autoionization*
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 32.80H *Auger effect and inner-shell ionization*
 32.80K *Multiphoton processes*
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- 33.00 MOLECULAR SPECTRA AND INTERACTIONS WITH PHOTONS
 33.10 Calculation of molecular spectra
 33.20 Molecular spectra grouped by wavelength ranges
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 33.80E *Autoionization, photoionization, and photodetachment*
 33.80G *Diffuse spectra; predissociation, photodissociation*
 33.80K *Multiphoton processes*
 33.90 Other topics in molecular spectra and interactions with photons
- 34.00 ATOMIC AND MOLECULAR COLLISION PROCESSES AND INTERACTIONS
 34.10 General theories and models
 34.20 Interatomic and intermolecular potentials and forces
 34.30 Potential energy surfaces for collisions
 34.40 Elastic scattering of atoms and molecules
 34.50 Inelastic scattering of atoms and molecules
 34.50E *Rotational and vibrational energy transfer*
 34.50H *Electronic excitation and ionization (including beam-foil excitation and ionization)*
- 34.50L *Chemical reactions, energy disposal, and angular distribution, as studied by atomic and molecular beams*
 34.70 Charge transfer
 34.80 Electron scattering, electron spectra
 34.80B *Elastic scattering of electrons by atoms and molecules*
 34.80D *Atomic excitation and ionization by electron impact*
 34.80G *Molecular excitation, ionization, and dissociation by electron impact*
 34.90 Other topics in atomic and molecular collision processes and interactions
- 35.00 PROPERTIES OF ATOMS AND MOLECULES; INSTRUMENTS AND TECHNIQUES
 35.10 Atoms
 35.10B *Atomic masses, mass spectra, abundances, and isotopes*
 35.10D *Electric and magnetic moments, polarizability*
 35.10F *Fine- and hyperfine-structure constants*
 35.10H *Ionization potentials, electron affinities*
 35.10W *Weak interactions*
 35.20 Molecules
 35.20B *General molecular conformation and symmetry; stereochemistry*
 35.20D *Interatomic distances and angles*
 35.20G *Bond strengths, dissociation energies, hydrogen bonding, etc.*
 35.20J *Barrier heights (internal rotation, inversion); rotational isomerism, conformational dynamics*
 35.20M *Electric and magnetic moments (and derivatives), polarizability, and magnetic susceptibility*
 35.20P *Rotation, vibration, and vibration-rotation constants*
 35.20S *Hyperfine- and fine-structure constants*
 35.20V *Ionization potentials, electron affinities, molecular core binding energy*
 35.20W *Weak interactions*
 35.20X *Mass spectra*
 35.20Y *Correlation times in molecular dynamics*
 35.80 Atomic and molecular measurements and techniques
- 36.00 STUDIES OF SPECIAL ATOMS AND MOLECULES
 36.10 Exotic atoms and molecules (containing mesons, muons, and other abnormal particles)
 36.20 Macromolecules and polymer molecules
 36.40 Atomic and molecular clusters
 36.90 Other special atoms and molecules
- 40.00 CLASSICAL AREAS OF PHENOMENOLOGY
 41.00 ELECTRICITY AND MAGNETISM: FIELDS AND CHARGED PARTICLES
 41.10 Classical electromagnetism
 41.10D *Electrostatics, magnetostatics*
 41.10F *Steady-state electromagnetic fields; electromagnetic induction*
 41.10H *Electromagnetic waves: theory*
 41.70 Particles in electromagnetic fields: classical aspects
 41.80 Particle beams and particle optics
 41.80D *Electron beams and electron optics*
 41.80G *Ion beams and ion optics*
 41.90 Other topics in electricity and magnetism
- 42.00 OPTICS
 42.10 Propagation and transmission in homogeneous media
 42.20 Propagation and transmission in inhomogeneous media

- 42.30 Optical information, image formation and analysis
- 42.40 Holography
- 42.50 Quantum optics
- 42.52 Masers
- 42.55 Lasing processes
- 42.55B *General theory of lasing action*
- 42.55D *CO₂ lasers*
- 42.55F *Inert gas lasers*
- 42.55H *Lasing action in other gas lasers*
- 42.55K *Chemical lasers*
- 42.55M *Lasing action in liquids and organic dyes*
- 42.55P *Lasing action in semiconductors with junctions*
- 42.55R *Lasing action in other solids*
- 42.55T *Free electron lasers*
- 42.60 Laser systems and laser beam applications
- 42.60B *Design of specific laser systems*
- 42.60D *Laser resonators and cavities*
- 42.60F *Laser beam modulation*
- 42.60H *Optical problems related to properties and interactions of laser beams*
- 42.60K *Optical problems related to applications of laser beams*
- 42.65 Nonlinear optics
- 42.65C *Stimulated Raman, Brillouin, and Rayleigh scattering; parametric oscillations and harmonic generation*
- 42.65F *Phase conjugation*
- 42.65G *Photon echoes, self-induced transparency, optical saturation and related effects*
- 42.65J *Beam trapping, self focusing, thermal blooming, and related effects*
- 42.70 Optical materials
- 42.70C *Glass*
- 42.70G *Light-sensitive materials*
- 42.72 Optical sources and standards
- 42.78 Optical lens and mirror systems
- 42.78H *Coatings*
- 42.80 Optical devices, techniques and applications
- 42.80B *Spatial filters, zone plates*
- 42.80C *Spectral and other filters*
- 42.80D *Monochromators*
- 42.80E *Shutters, windows, diaphragms, deflectors, choppers*
- 42.80F *Gratings, echelles*
- 42.80K *Optical beam modulators*
- 42.80L *Optical waveguides*
- 42.80M *Fibre optics*
- 42.80Q *Image detectors, convertors, and intensifiers*
- 42.80S *Optical communications devices*
- 42.82 Integrated optics
- 42.85 Optical testing and workshop techniques
- 42.90 Other topics in optics
- 43.00 ACOUSTICS
- 43.20 General linear acoustics
- 43.25 Nonlinear acoustics and macrosonics
- 43.28 Aeroacoustics and atmospheric sound
- 43.30 Underwater sound
- 43.35 Ultrasonics, quantum acoustics, and physical effects of sound
- 43.40 Mechanical vibrations and shock
- 43.45 Statistical studies of acoustical response
- 43.50 Noise, its effects and control
- 43.55 Architectural acoustics
- 43.60 Acoustic signal processing
- 43.63 Acoustic holography
- 43.70 Speech communication
- 43.75 Music and musical instruments
- 43.85 Acoustical measurements and instrumentation
- 43.88 Transduction; devices for the generation and reproduction of sound
- 43.90 Other topics in acoustics
- 44.00 HEAT FLOW, THERMAL AND THERMODYNAMIC PROCESSES
- 44.10 Heat conduction (models, phenomenological description)
- 44.25 Convection
- 44.30 Heat transfer in inhomogeneous media and through interfaces
- 44.40 Heat radiation
- 44.50 Thermal properties of matter (phenomenology)
- 44.60 Thermodynamic processes (phenomenology)
- 44.90 Other topics in heat flow, thermal and thermodynamic processes
- 46.00 MECHANICS, ELASTICITY, RHEOLOGY
- 46.10 Mechanics of discrete systems
- 46.20 Continuum mechanics
- 46.30 Mechanics of solids
- 46.30C *Elasticity*
- 46.30J *Viscoelasticity, plasticity, viscoplasticity, creep, and stress relaxation*
- 46.30L *Buckling and instability*
- 46.30M *Vibrations, aeroelasticity, hydroelasticity, mechanical waves, and shocks*
- 46.30N *Fracture mechanics, fatigue, and cracks*
- 46.30P *Friction, wear, adherence, hardness, mechanical contacts*
- 46.30R *Measurement methods and techniques*
- 46.60 Rheology of fluids and pastes
- 46.90 Other topics in mechanics, elasticity, and rheology
- 47.00 FLUID DYNAMICS
- 47.10 General theory
- 47.15 Laminar flows
- 47.15C *Laminar boundary layers*
- 47.15F *Stability of laminar flows*
- 47.20 Hydrodynamic stability and instability
- 47.25 Turbulent flows, convection, and heat transfer
- 47.25C *Isotropic turbulence*
- 47.25F *Boundary layer and shear turbulence*
- 47.25J *Turbulent diffusion*
- 47.25M *Noise (turbulence generated)*
- 47.25Q *Convection and heat transfer*
- 47.25R *Wakes*
- 47.30 Rotational flow and vorticity
- 47.35 Waves
- 47.40 Compressible flows; shock and detonation phenomena
- 47.40D *General subsonic flows*
- 47.40H *Transonic flows*
- 47.40K *Supersonic and hypersonic flows*
- 47.40N *Shock-wave interactions*
- 47.45 Rarefied gas dynamics
- 47.50 Non-newtonian dynamics
- 47.55 Nonhomogeneous flows
- 47.55B *Cavitation*
- 47.55C *Jets*
- 47.55E *Nozzles*
- 47.55H *Stratified flows*

- 47.55K *Multiphase flows*
 47.55M *Flow through porous media*
 47.60 Flows in ducts, channels, and conduits
 47.65 Magnetohydrodynamics and electrohydrodynamics
 47.70 Reactive, radiative, or nonequilibrium flows
 47.75 Relativistic fluid dynamics
 47.80 Instrumentation for fluid dynamics
 47.90 Other topics in fluid dynamics
- 50.00 **FLUIDS, PLASMAS AND ELECTRIC DISCHARGES**
- 51.00 KINETIC AND TRANSPORT THEORY OF FLUIDS;
 PHYSICAL PROPERTIES OF GASES
 51.10 Kinetic and transport theory
 51.20 Viscosity and diffusion: experimental
 51.30 Thermal properties of gases
 51.40 Acoustical properties of gases; ultrasonic relaxation
 51.50 Electrical phenomena in gases
 51.60 Magnetic phenomena in gases
 51.70 Optical phenomena in gases
 51.90 Other topics in the physics of fluids
- 52.00 THE PHYSICS OF PLASMAS AND ELECTRIC
 DISCHARGES
 52.20 Elementary processes in plasma
 52.20F *Electron collisions*
 52.20H *Atomic, molecular, heavy-particle collisions*
 52.25 Plasma: basic properties
 52.25F *Transport properties*
 52.25P *Emission, absorption and scattering of radiation*
 52.30 Plasma flow; magnetohydrodynamics
 52.35 Waves, oscillations, and instabilities in plasma
 52.35R *Plasma turbulence*
 52.35T *Shock waves*
 52.40 Plasma interactions
 52.40D *Electromagnetic wave propagation in plasma*
 52.40F *Antennas in plasma; plasma-filled wave guides*
 52.40H *Solid-plasma interactions*
 52.40K *Sheaths*
 52.40M *Particle beam interactions in plasma*
 52.50 Plasma production and heating
 52.50J *Plasma production and heating by laser beams*
 52.50L *Plasma production and heating by shock wave and wire explosion*
 52.55 Plasma equilibrium and confinement
 52.60 Relativistic plasma
 52.65 Plasma simulation
 52.70 Plasma diagnostic techniques and instrumentation
 52.75 Plasma devices and applications
 52.80 Electric discharges
 52.90 Other topics in plasma physics and electric discharges
- 60.00 **CONDENSED MATTER: STRUCTURE, THERMAL
 AND MECHANICAL PROPERTIES**
- 61.00 STRUCTURE OF LIQUIDS AND SOLIDS;
 CRYSTALLOGRAPHY
 61.10 X-ray determination of structures
 61.10D *Theories of diffraction and scattering*
 61.10F *Experimental techniques*
 61.12 Neutron determination of structures
 61.14 Electron determination of structures
 61.14D *Theories of diffraction and scattering*
- 61.14F *Experimental diffraction and scattering*
 61.14H *Low-energy electron diffraction (LEED) and reflection high-energy electron diffraction (RHEED)*
 61.16 Other determination of structures
 61.16D *Electron microscopy determinations*
 61.16F *Field-ion microscopy determinations*
 61.16N *EPR and NMR determinations*
 61.20 Classical, semiclassical, and quantum theories of liquid structure
 61.25 Studies of specific liquid structures
 61.25M *Liquid metals*
 61.30 Liquid crystals
 61.40 Amorphous and polymeric materials
 61.40D *Glasses*
 61.40K *Polymers, elastomers, and plastics*
 61.50 Crystalline state
 61.50C *Physics of crystal growth*
 61.50E *Crystal symmetry; models and space groups, and crystalline systems and classes*
 61.50J *Crystal morphology and orientation*
 61.50K *Crystallographic aspects of polymorphic and order-disorder transformations*
 61.50L *Crystal binding*
 61.55 Specific structure of elements and alloys
 61.55D *Nonmetallic elements*
 61.55F *Metallic elements*
 61.55H *Alloys*
 61.60 Specific structure of inorganic compounds
 61.65 Specific structure of organic compounds
 61.70 Defects in crystals
 61.70B *Interstitials and vacancies*
 61.70D *Colour centres*
 61.70E *Other point defects*
 61.70G *Dislocations: theory*
 61.70J *Etch pits, decoration, transmission electron-microscopy and other direct observations of dislocations*
 61.70L *Slip, creep, internal friction and other indirect evidence of dislocations*
 61.70N *Grain and twin boundaries*
 61.70P *Stacking faults, stacking fault tetrahedra and other planar or extended defects*
 61.70R *Crystal impurities: general*
 61.70T *Doping and implantations of impurities*
 61.70W *Impurity concentrations, distribution, and gradients*
 61.70Y *Interaction between different crystal structure defects*
 61.80 Radiation damage and other irradiation effects
 61.80B *Laser beams*
 61.80C *X-rays*
 61.80E *Gamma rays*
 61.80F *Electrons and positrons*
 61.80H *Neutrons*
 61.80J *Ions*
 61.80L *Atoms and molecules*
 61.80M *Channeling, blocking and energy loss of particles*
 61.90 Other topics in structure of liquids and solids
- 62.00 **MECHANICAL AND ACOUSTIC PROPERTIES OF
 CONDENSED MATTER**
 62.10 Mechanical properties of liquids
 62.20 Mechanical properties of solids (related to microscopic structure)
 62.20D *Elastic constants*
 62.20F *Deformation and plasticity*

- 62.20H *Creep*
 62.20M *Fatigue, brittleness, fracture, and cracks*
 62.20P *Tribology*
 62.30 Mechanical and elastic waves
 62.40 Anelasticity, internal friction, and damping
 62.50 High-pressure and shock-wave effects in solids
 62.60 Acoustic properties of liquids
 62.65 Acoustic properties of solids
 62.80 Ultrasonic relaxation
 62.90 Other topics in mechanical and acoustical properties of condensed matter
- 63.00 LATTICE DYNAMICS AND CRYSTAL STATISTICS
 63.10 General theory
 63.20 Phonons and vibrations in crystal lattices
 63.20D *Phonon states and bands, normal modes, and phonon dispersion*
 63.20H *Phonon-phonon interactions*
 63.20K *Phonon-electron interactions*
 63.20M *Phonon-defect interactions*
 63.20P *Localized modes*
 63.50 Vibrational states in disordered systems
 63.70 Statistical mechanics of lattice vibrations
 63.75 Statistical mechanics of displacive phase-transitions
 63.90 Other topics in lattice dynamics and crystal statistics
- 64.00 EQUATIONS OF STATE, PHASE EQUILIBRIA, AND PHASE TRANSITIONS
 64.10 General theory of equations of state and phase equilibria
 64.30 Equations of state of specific substances
 64.60 General studies of phase transitions
 64.70 Phase equilibria, phase transitions, and critical points
 64.70D *Solid-liquid transitions*
 64.70F *Liquid-vapour transitions*
 64.70H *Solid-vapour transitions*
 64.70J *Liquid-liquid transitions*
 64.70K *Solid-solid transitions*
 64.70M *Transitions in liquid crystals*
 64.70P *Glass transitions*
 64.75 Solubility, segregation, and mixing
 64.80 Other phase properties of systems
 64.90 Other topics in equations of state, phase equilibria, and phase transitions
- 65.00 THERMAL PROPERTIES OF CONDENSED MATTER
 65.20 Heat capacities of liquids
 65.40 Heat capacities of solids
 65.50 Thermodynamic properties and entropy
 65.70 Thermal expansion and thermomechanical effects
 65.90 Other topics in thermal properties of condensed matter
- 66.00 TRANSPORT PROPERTIES OF CONDENSED MATTER (NONELECTRONIC)
 66.10 Diffusion and ionic conduction in liquids
 66.20 Diffusive momentum transport
 66.30 Diffusion in solids
 66.30D *Theory of diffusion and ionic conduction in solids*
 66.30F *Self-diffusion in metals, semimetals, and alloys*
 66.30H *Self-diffusion and ionic conduction in nonmetals*
 66.30J *Diffusion, migration, and displacement of impurities*
 66.30L *Diffusion, migration, and displacement of other defects*
 66.30N *Chemical interdiffusion*
 66.30Q *Electromigration*
- 66.60 Thermal conduction in nonmetallic liquids
 66.70 Nonelectronic thermal conduction and heat-pulse propagation in nonmetallic solids
 66.90 Other topics in nonelectronic transport properties
- 67.00 QUANTUM FLUIDS AND SOLIDS; LIQUID AND SOLID HELIUM
 67.20 Quantum effects on the structure and dynamics of non-degenerate fluids
 67.40 Boson degeneracy and superfluidity of helium-4
 67.50 Fermi fluids; liquid helium-3
 67.60 Mixed systems; liquid helium 3-4 mixtures
 67.70 Films
 67.80 Solid helium and related quantum crystals
 67.90 Other topics in quantum fluids and solids (e.g. neutron-star matter)
- 68.00 SURFACES AND INTERFACES; THIN FILMS AND WHISKERS
 68.10 Fluid surfaces and interfaces with fluids
 68.15 Liquid thin films
 68.20 Solid surface structure
 68.25 Mechanical and acoustical properties of solid surfaces and interfaces
 68.30 Dynamics of solid surfaces and interface vibrations
 68.40 Surface energy of solids; thermodynamic properties
 68.45 Solid-fluid interface processes
 68.48 Solid-solid interfaces
 68.55 Thin film growth, structure, and epitaxy
 68.60 Physical properties of thin films, nonelectronic
 68.70 Whiskers and dendrites: growth, structure, and nonelectronic properties
 68.90 Other topics in the structure and nonelectronic properties of surfaces and thin films
- 70.00 CONDENSED MATTER: ELECTRONIC STRUCTURE, ELECTRICAL, MAGNETIC, AND OPTICAL PROPERTIES
- 71.00 ELECTRON STATES
 71.10 General theories and computational techniques
 71.20 Electronic density of states determinations
 71.25 Nonlocalized single-particle electronic states
 71.25C *Techniques of band-structure calculation (general theory, applications of group theory, analytic continuation, etc.)*
 71.25H *Measurement of Fermi surface parameters*
 71.25J *Effective mass and g-factors*
 71.25L *Electron energy states in liquid metals*
 71.25M *Electron energy states in amorphous and glassy solids*
 71.25P *Band structure of crystalline metals*
 71.25R *Band structure of crystalline elemental semiconductors*
 71.25T *Band structure of crystalline semiconductor compounds and insulators*
 71.30 Metal-insulator transitions
 71.35 Excitons and related phenomena
 71.36 Polaritons
 71.38 Polarons and electron-phonon interactions
 71.45 Collective effects
 71.45G *Exchange, correlation, dielectric and magnetic functions, plasmons*
 71.45J *Fermi-Thomas model*
 71.45N *Calculations of total electronic binding energy*

- 71.50 Localized single-particle electronic states
 71.55 Impurity and defect levels
 71.55J *Localization in disordered structures*
 71.65 Positron states
 71.70 Level splitting and interactions
 71.70C *Crystal and ligand fields*
 71.70E *Spin-orbit coupling, Zeeman, Stark, and strain splitting*
 71.70G *Exchange interactions*
 71.70J *Nuclear states and interactions*
 71.70M *Other bulk localised states*
 71.90 Other topics in electron states
- 72.00 ELECTRONIC TRANSPORT IN CONDENSED MATTER
 72.10 Theory of electronic transport; scattering mechanisms
 72.15 Electronic conduction in metals and alloys
 72.15C *Electrical and thermal conduction in amorphous and liquid metals and alloys*
 72.15E *Electrical and thermal conduction in crystalline metals and alloys*
 72.15G *Galvanomagnetic and other magnetotransport effects*
 72.15H *Thermomagnetic effects*
 72.15J *Thermoelectric effects*
 72.15L *Relaxation times and mean free paths*
 72.15N *Collective modes; e.g. in one-dimensional conductors*
 72.15Q *Scattering mechanisms and Kondo effect*
 72.20 Conductivity phenomena in semiconductors and insulators
 72.20D *General theory, scattering mechanisms*
 72.20F *Low-field transport and mobility; piezoresistance*
 72.20H *High-field and nonlinear effects*
 72.20J *Charge carriers; generation, recombination, lifetime, and trapping*
 72.20M *Galvanomagnetic and other magnetotransport effects*
 72.20N *Thermomagnetic effects*
 72.20P *Thermoelectric effects*
 72.30 High-frequency effects; plasma effects
 72.40 Photoconduction and photovoltaic effects; photodielectric effects
 72.50 Acoustoelectric effects
 72.55 Magnetoacoustic effects
 72.60 Mixed conductivity and conductivity transitions
 72.70 Noise processes and phenomena
 72.80 Conductivity of specific semiconductors and insulators
 72.80C *Elemental semiconductors*
 72.80E *III-V and II-VI semiconductors*
 72.80G *Transition-metal compounds*
 72.80J *Other crystalline inorganic semiconductors*
 72.80L *Organic semiconductors*
 72.80N *Amorphous and glassy semiconductors*
 72.80P *Liquid semiconductors*
 72.90 Other topics in electronic transport in condensed matter
- 73.00 ELECTRONIC STRUCTURE AND ELECTRICAL PROPERTIES OF SURFACES, INTERFACES, AND THIN FILMS
 73.20 Electronic surface states
 73.25 Surface conductivity
 73.30 Surface double layers, Schottky barriers, and work functions
 73.40 Interfaces
 73.40B *Static electrification*
 73.40G *Tunnelling: general*
 73.40J *Metal-to-metal contacts*
 73.40L *Semiconductor-to-semiconductor contacts, p-n junctions, and heterojunctions*
- 73.40M *Semiconductor-electrolyte contacts*
 73.40N *Metal-nonmetal contacts*
 73.40Q *Metal-insulator-semiconductor structures*
 73.40R *Metal-insulator-metal structures*
 73.40S *Metal-semiconductor-metal structures*
 73.40T *Semiconductor-insulator-semiconductor structures*
 73.40V *Semiconductor-metal-semiconductor structures*
 73.60 Electronic properties of thin films
 73.60D *Metallic thin films*
 73.60F *Semiconductor films*
 73.60H *Insulating thin films*
 73.60K *Superconducting films*
 73.90 Other topics in electrical properties of surfaces, interfaces, and thin films
- 74.00 SUPERCONDUCTIVITY
 74.10 Occurrence, critical temperature
 74.20 Theory
 74.20F *BCS theory and its application*
 74.30 General properties
 74.30C *Magnetization curves, Meissner effect, penetration depth*
 74.30E *Thermodynamic properties; thermal conductivity*
 74.30G *Response to electromagnetic fields, nuclear magnetic resonance, ultrasonic attenuation*
 74.40 Fluctuations and critical effects
 74.50 Proximity effects, tunnelling phenomena, and Josephson effect
 74.55 Type-I superconductivity
 74.60 Type-II superconductivity
 74.60E *Mixed state, H_{c2} surface sheath*
 74.60G *Flux pinning; fluxon-defect interactions*
 74.60J *Critical currents*
 74.70 Superconducting materials
 74.70D *Material effects on T_c , K , critical currents*
 74.70G *Type-I superconductors (nontransition metals)*
 74.70L *Type-II superconductors (transition metals, alloys and compounds)*
 74.70N *Dirty superconductors*
 74.70P *Materials for high-field applications*
 74.90 Other topics in superconductivity
- 75.00 MAGNETIC PROPERTIES AND MATERIALS
 75.10 General theory and models of magnetic ordering
 75.10D *Crystal-field theory and spin Hamiltonians*
 75.10H *Ising and other classical spin models*
 75.10J *Heisenberg and other quantized localized spin models*
 75.10L *Band and itinerant models*
 75.20 Diamagnetism and paramagnetism
 75.20C *Nonmetals*
 75.20E *Metals and alloys*
 75.20H *Local moments in dilute alloys; Kondo effect*
 75.25 Spin arrangements in magnetically ordered materials (neutron studies, etc.)
 75.30 Magnetically ordered materials, other intrinsic properties
 75.30C *Saturation moments and magnetic susceptibility*
 75.30D *Spin waves*
 75.30E *Exchange and superexchange interactions*
 75.30G *Anisotropy*
 75.30H *Magnetic impurity interactions*
 75.30K *Magnetic phase boundaries*
 75.30S *Magnetocaloric effect*
 75.40 Critical-point effects, specific heats, short-range order
 75.40D *Ising and other classical spin models*

- 75.40F *Heisenberg and other quantized spin models*
 75.50 Studies of specific magnetic materials
 75.50B *Ferromagnetism of Fe and its alloys*
 75.50C *Ferromagnetism of other metals*
 75.50D *Ferromagnetism of nonmetals*
 75.50E *Antiferromagnetics*
 75.50G *Ferrimagnetics*
 75.50K *Amorphous magnetic materials*
 75.50M *Magnetic liquids*
 75.60 Domain effects, magnetization curves, and hysteresis
 75.60C *Domain walls and domain structure*
 75.60E *Magnetization curves, hysteresis, Barkhausen and related effects*
 75.60G *High coercivity materials*
 75.60J *Fine-particle systems*
 75.60L *Magnetic aftereffects*
 75.60N *Magnetic annealing and temperature- hysteresis effects*
 75.70 Magnetic films and plates
 75.70K *Domain structure (magnetic bubbles)*
 75.80 Magnetomechanical and magnetoelectric effects, magnetostriction
 75.90 Other topics in magnetic properties and materials
 76.00 MAGNETIC RESONANCES AND RELAXATION IN CONDENSED MATTER; MÖSSBAUER EFFECT
 76.20 General theory of resonances and relaxation
 76.30 Electron paramagnetic resonance and relaxation
 76.30D *Ions and impurities: general*
 76.30F *Iron group (3d) ions and impurities (Ti-Cu)*
 76.30H *Platinum and palladium group (4d and 5d) ions and impurities (Zr-Ag and Hf-Au)*
 76.30K *Rare-earth ions and impurities*
 76.30L *Other ions and impurities*
 76.30M *Colour centres and other defects*
 76.30P *Conduction electrons*
 76.30R *Free radicals*
 76.40 Diamagnetic and cyclotron resonances
 76.50 Ferromagnetic, antiferromagnetic, and ferrimagnetic resonances; spin wave resonance
 76.60 Nuclear magnetic resonance and relaxation
 76.60C *Chemical and Knight shifts*
 76.60E *Relaxation effects*
 76.60G *Quadrupole resonance*
 76.60L *Spin echoes*
 76.70 Magnetic double resonances and cross effects
 76.70D *Electron-nuclear double resonance (ENDOR)*
 76.70E *Dynamical nuclear polarization*
 76.70F *Double nuclear magnetic resonance (DNMR)*
 76.70H *Optical double magnetic resonance (ODMR)*
 76.70K *Electron double resonance (ELDOR)*
 76.80 Mössbauer effect; other gamma-ray spectroscopy
 76.90 Other topics in magnetic resonance and relaxation
 77.00 DIELECTRIC PROPERTIES AND MATERIALS
 77.20 Permittivity
 77.30 Polarization and depolarization effects
 77.40 Dielectric loss and relaxation
 77.50 Dielectric breakdown and space-charge effects
 77.55 Dielectric thin films
 77.60 Piezoelectricity and electrostriction
 77.70 Pyroelectric and electrocaloric effects
 77.80 Ferroelectricity and antiferroelectricity
 77.80B *Transitions and Curie point*
 77.80D *Domain structure and effects; hysteresis*
 77.85 Electrical resonances
 77.90 Other topics in dielectric properties and materials
 78.00 OPTICAL PROPERTIES AND CONDENSED MATTER SPECTROSCOPY AND OTHER INTERACTIONS OF MATTER WITH PARTICLES AND RADIATION
 78.20 Optical properties and materials
 78.20B *General theory (for pure homogeneous materials)*
 78.20D *Optical constants and parameters*
 78.20E *Optical rotatory power*
 78.20F *Birefringence*
 78.20H *Piezo-, elasto- and acousto-optical effects*
 78.20J *Electro-optical effects*
 78.20L *Magneto-optical effects*
 78.20N *Thermo-optical effects*
 78.30 Infrared and Raman spectra and scattering
 78.35 Brillouin and Rayleigh scattering
 78.40 Visible and ultraviolet spectra
 78.45 Stimulated emission
 78.50 Impurity and defect absorption in solids
 78.55 Photoluminescence
 78.60 Other luminescence spectra and radiative recombination
 78.60F *Electroluminescence*
 78.60H *Cathodoluminescence, ionoluminescence*
 78.60K *Thermoluminescence*
 78.60M *Sonoluminescence, triboluminescence*
 78.60P *Chemiluminescence*
 78.65 Optical properties of thin films
 78.70 Other interactions of matter with particles and radiation
 78.70B *Positron annihilation*
 78.70C *X-ray scattering*
 78.70D *X-ray absorption and absorption edges*
 78.70E *X-ray emission threshold and fluorescence*
 78.70G *Microwave and radiofrequency spectra*
 78.90 Other topics in optical properties of condensed matter and other interactions of matter with particles and radiation
 79.00 ELECTRON AND ION EMISSION BY LIQUIDS AND SOLIDS; IMPACT PHENOMENA
 79.20 Impact phenomena
 79.20D *Laser-light impact phenomena*
 79.20F *Electron impact: Auger emission*
 79.20H *Electron impact: secondary emission*
 79.20K *Other electron impact phenomena*
 79.20N *Atom, molecule, and ion impact*
 79.20R *Atomic and molecular beam interactions*
 79.40 Thermionic emission
 79.60 Photoemission and photoelectron spectra
 79.70 Field emission and field ionization
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